

MITE PREDATORS IN EASTERN NEW YORK
COMMERCIAL APPLE ORCHARDS¹

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Abstract.—A survey for predators of apple leaf-feeding mite species was made during mid-summer of 1975, 1976, and 1977. Apple leaves were collected from 36 commercial orchards throughout the 10 major fruit-growing counties of Eastern New York. The phytoseiid mite predators *Amblyseius fallacis* (Garman), *Typhlodromus pomis* (Parrott), and *Typhlodromus* sp. were found in 26, 2, and 1 of the orchards, respectively. The stigmatiid *Zetzellia mali* (Ewing) was found in eight of the orchards, while the coccinellid beetle *Stethorus punctum* LeConte was found in one. Results of this survey suggest that Eastern New York apple growers could utilize certain of these mite predators in integrated mite control programs similar to those developed in other areas.

Introduction

Recent emphasis on more efficient utilization of chemical pesticides in deciduous orchards has encouraged the development of integrated mite control programs employing mite natural enemies in addition to chemical and cultural control methods (Glass, 1975). The development of widespread resistance to organophosphate insecticides among predatory mites of the family Phytoseiidae (Croft and Brown, 1975) has provided much of the impetus for such programs.

Dean (unpublished manuscript) listed four species of plant-feeding mites on apple trees in the Hudson Valley including the European red mite, *Panonychus ulmi* (Koch), twospotted spider mite, *Tetranychus urticae* Koch, clover mite, *Bryobia praetiosa* Koch, and apple rust mite, *Aculus schlechtendali* (Nalepa). The aforementioned species plus the McDaniel spider mite, *Tetranychus mcdanieli* McGregor, have been reported (Brann, 1976) in the Champlain Valley.

Dean (unpublished manuscript) listed the ladybird beetle, *Stethorus punctum* LeConte, as the most common mite predator in the Hudson Valley and reported that two bugs *Hyaloides vitripennis* (Say) and *Orius insidiosus* Say, known to feed on the European red mite had been largely eliminated from most orchards by DDT sprays. Dean also found predaceous phyto-

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seiids but considered their influence slight. Specimens of the predaceous stigmatid, *Zetzellia mali* (Ewing), were collected during 1969 from the Hudson Valley Laboratory orchards by Dr. Dean and identified by Dr. E. W. Baker.

Phytoseiid mite predators were found where reduced rates of miticides were used in large plot mite control studies conducted during 1974 in the Champlain Valley. Subsequent trials in both the Hudson and Champlain Valleys indicated that the phytoseiids were providing biological control of the European red mite (Weires, unpublished data). A limited survey for mite predators was conducted in Ulster and Clinton counties during 1975, while the survey was expanded during 1976 and 1977 to include these as well as eight other counties (Fig. 1) throughout Eastern New York.

Materials and Methods

Leaf samples were collected from six orchards in Clinton and Ulster counties in 1975, from 22 orchards throughout Ulster, Clinton, Saratoga, Orange, Rockland, Putnam, and Greene counties in 1976, and from twelve orchards in Columbia, Dutchess, Rennselaer, Rockland and Orange counties in 1977. Orchards were randomly selected with the help of Cooperative Extension fruit agents. Sample size varied, but at most locations four to eight blocks which included at least two varieties (one of them McIntosh) and ranged in size from 5–15 acres were sampled by collecting 10 leaves/tree from five trees in each block. More intensive sampling was conducted where greater precision was required to determine predator-prey ratios. The number of samples/orchard, leaves/sample, and leaves/tree, as well as the sampling date and location are presented in Table 1.

Mites were brushed from the leaves onto a glass plate coated with glue using a mite brushing machine (Henderson & McBurnie, 1943). All mite species and stages were counted and growers were sent a report of the counts. Predatory mites were carefully removed from the plates, placed in 95% EtOH, and mounted in PVA modified Heinz medium.

Dr. Chand Watve (Geneva, NY) helped collect, mount, and identify the phytoseiids during 1975, while in 1976 and 1977 the phytoseiids were mounted and identified by Mr. Smith and confirmed by Dr. Watve. Collections of the stigmatidae were compared with original specimens determined by Dr. Baker or sent to Dr. Watve. The coccinellids were determined by Dr. John Leeper (Geneva, NY).

Results and Discussion

Three species of phytoseiid predators were found. *Amblyseius fallacis* (Garman) was the predominant species. *Typhlodromus pomi* (Parrott) was found in one orchard during 1975 and 1976 (Table 1). Another unidentified *Typhlodromus* species was also found in one orchard in 1975.

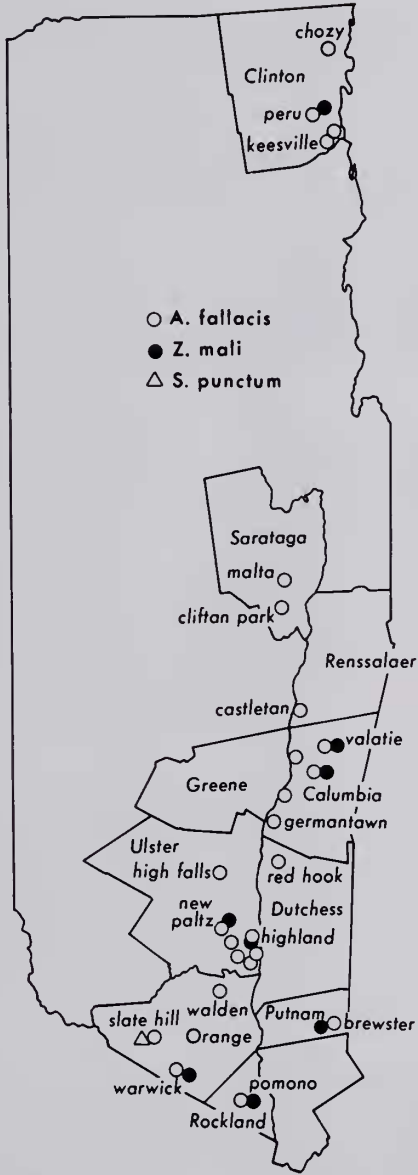


Fig. 1. Location of commercial apple orchards surveyed for mite predators in Eastern New York, 1975–1977.

Amblyseius fallacis was found in 5 of the 6, 14 of the 22, and 11 of the 12 orchards surveyed in 1975, 1976, and 1977, respectively. *Zetzellia mali* was found in three of the orchards surveyed each season. *Stethorus punctum* was found in the same orchard in both 1976 and 1977.

Table 1. Mite predators in Eastern New York Commercial Apple Orchards—1975–1977.

Date sam- pled	Orchard	City or village	County	No. sam- ples	No. leaves/ sample	No. leaves/ tree	Predator species		
							<i>A. fal- laci</i>	<i>Z. mali</i>	<i>S. punc- tum</i>
1975									
7/29	A	New Paltz	Ulster	48	25	25	X ¹	X	O
7/29	B	Clintondale	Ulster	4	50	25	X	O	O
7/29	C	High Falls	Ulster	4	50	25	X	O	O
7/29	D	Highland	Ulster	39	25	25	X	X	O
7/29	E	Keesville	Clinton	48	25	25	X	O	O
7/29	F	Peru	Clinton	4	25	25	O	X	O
1976									
7/22	G	Brewster	Putnam	4	50	25	X	X	O
7/26	H	Pomona	Rockland	12	50	25	O	O	O
8/3	I	Slate Hill	Orange	5	50	10	O	O	X
8/3	J	Warwick	Orange	5	50	10	X ²	X	O
8/18	K	Walden	Orange	6	50	10	X	O	O
8/3	L	Walden	Orange	8	50	10	X	O	O
8/2	M	Plattekill	Ulster	4	50	10	O	O	O
8/2	N	Plattekill	Ulster	4	50	10	X	O	O
8/2	O	Marlboro	Ulster	4	50	10	X	O	O
7/20	P	Milton	Ulster	40	25	25	X ¹	O	O
8/2	Q	New Paltz	Ulster	5	50	25	X	O	O
6/24	D	Highland	Ulster	36	25	25	X	X	O
8/2	R	Ulster Park	Ulster	4	50	10	O	O	O
7/22	S	Athens	Greene	4	50	10	O	O	O
7/22	T	Malta	Saratoga	4	50	25	X	O	O
7/22	U	Clifton Park	Saratoga	4	50	25	X	O	O
7/22	V	Rexford	Saratoga	4	50	25	O	O	O
7/13	E	Keesville	Clinton	52	25	25	X	O	O
8/13	W	Peru	Clinton	4	50	10	X	O	O
8/13	X	Chazy	Clinton	4	50	10	O	O	O
8/13	Y	Chazy	Clinton	4	50	10	O	O	O
8/13	Z	Chazy	Clinton	2	50	10	X	O	O
1977									
8/1	AA	Claverack	Columbia	6	50	10	O	O	O
8/2	BB	Red Hook	Dutchess	6	50	10	X	O	O
8/2	CC	Germantown	Columbia	8	50	10	X	O	O
8/2	DD	Greenport	Columbia	8	50	10	X	O	O
8/3	EE	Red Hook	Dutchess	4	50	10	X	O	O
8/4	I	Slate Hill	Orange	8	50	10	X	O	X
8/4	FF	New Hampton	Orange	4	50	10	X	O	O
8/4	H	Pomona	Rockland	8	50	10	X	X	O
8/5	GG	Valatie Co	Columbia	8	50	10	X	X	O
8/5	HH	Kinderhook	Columbia	6	50	10	X	O	O
8/5	II	Castleton	Rensselaer	6	50	10	X	O	O
8/5	JJ	West Ghent	Columbia	4	50	10	X	X	O

X = present. O = absent.

¹ Several *Typhlodromus pomi*.² Several *Typhlodromus* sp?.

Amblyseius fallacis was found where a variety of orchard spray programs were used, whereas *T. pomi* and *Z. mali* were only found in young, seldom-sprayed orchards or in older orchards being brought back into production or receiving a very minimal spray program. *Stethorus punctum* was found in an orchard which received regular sprays, but in which European red mite populations exceeded five mites/leaf at the time of sampling.

Knisley and Swift (1972) found eight species of phytoseiid mite predators in New Jersey apple orchards. *Amblyseius fallacis* was the predominant species in orchards receiving pesticide sprays while *Typhlodromus longipilus* Nesbitt was found less frequently. *Typhlodromus pomi* was the most common phytoseiid in abandoned orchards. The stigmatids *Z. mali* and *Agistemus fleschneri* (Summers) were found in both abandoned and commercial orchards (Knisley and Swift, 1972).

Growers throughout Eastern New York should be able to utilize *A. fallacis* in integrated mite control programs similar to those developed for other areas (Swift, 1968; Holdsworth, 1974; Croft, 1975). This is in contrast to the situation in Western New York where both *A. fallacis* and *Typhlodromus pyri* Scheuten are found with *T. pyri* predominant (Watve and Lienk, 1976 and pers. communication). The absence of *T. pyri* in our collections is considered a benefit (1) because of the threat it poses for *A. fallacis* through interspecific competition; (2) because of its low level of tolerance to the most commonly used organophosphate insecticides (Watve and Lienk, 1976); and (3) because there is some question as to its predatory effectiveness (Croft, 1976).

Utilizing *Z. mali* in an integrated program does not appear promising. *Zetzellia mali* is apparently susceptible to present pesticide programs. Recent work also suggests that because of spatial heterogeneity coupled with lack of feeding on female tetranychids, *Z. mali* may not be able to control phytophagous mites below economic damage levels (Santos, 1976). In addition Croft and McGroarty (1977) have observed that *A. fallacis* seemed unable to express its normal reproductive and predation potential in orchards where *A. fleschneri* and *Z. mali* were present at similar densities to *A. fallacis*.

Stethorus punctum was found in only one orchard during our collections. Croft and McGroarty (1977) reported that *S. punctum* occurred very sporadically in Michigan apple orchards but that its occurrence was unrelated to pesticide use patterns. Growers in the southwestern portion of the Hudson Valley should be able to utilize *S. punctum* in an integrated mite control program but would probably have to adapt the Pennsylvania integrated mite control practices (Tetrault et al., 1977) designed to protect *Stethorus*.

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